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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/589,844

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Thomas Schmidt

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EXAMINER

ARCIERO, ADAM A

ART UNIT

PAPER NUMBER

1727

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DELIVERY MODE

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/589,844	SCHMIDT ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	ADAM A. ARCIERO	1727	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 25 February 2011.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-34 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-34 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

Art Unit: 1727

**HIGH-PERFORMANCE MEMBRANE ELECTRODE UNIT AND THE USE THEREOF  
IN FUEL CELLS**

Examiner: Adam Arciero

S.N. 10/589,844

Art Unit 1727

May 5, 2011

**DETAILED ACTION**

1. The Applicant's amendment filed on February 25, 2011 was received. Claims 1-34 are currently pending. Claims 1 and 23 have been amended.
2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 102***

3. The claim rejections under 35 U.S.C. 102(b) as being anticipated by Bjerrum et al. on claims 1, 3-24 and 28-34 are withdrawn, because Applicant has amended the claims.

***Claim Rejections - 35 USC § 103***

4. The claim rejections under 35 U.S.C. 103(a) as being unpatentable over Bjerrum et al. and Kiefer et al. on claims 2 and 25-27 are withdrawn, because Applicant has amended the claims.
5. Claims 1 and 3-24 and 28-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjerrum et al. (WO 01/18894 A2, found in IDS) in view of Buchanan et al. (US 5,759,944 A).Kiefer et al. (US 2005/0084727 A1).

As to Claims 1 and 31, Bjerrum et al. discloses a membrane electrode assembly comprising an acid-doped solid electrolyte including at least one polymer with at least one nitrogen atom (polybenzimidazole) (pg. 9, line 15 to pg. 10, line 5) and at least one mineral acid (phosphoric acid) (pg. 13, lines 19-30). Bjerrum et al. discloses wherein at least one electrode comprises a catalyst comprising a composite of platinum with chromium, titanium or tungsten (pg. 16, lines 20-26). Bjerrum et al. does not specifically disclose wherein the catalyst comprises at least one precious metal of the platinum group, and/or at least one precious metal Au and/or Ag, as well as Ni.

However, Buchanan et al. teaches of a phosphoric acid fuel cell comprising a catalytically active layer comprising a catalyst composition such as platinum alloyed with Ni and Au (col. 1, line 54, to col. 2, line 8). Buchanan et al. is clearly teaching that Ni and Ti for use with platinum as a catalyst for a fuel cell electrode are considered functionally equivalent. Therefore, at the time of the invention, it would have been obvious to one of ordinary skill in the art to substitute the Pt/Au/Ni catalyst layer of Buchanan et al. for the Pt/Ti catalyst layer of Bjerrum et al., because Kiefer et al. teaches that they are recognized equivalents. Furthermore, it would have been obvious at the time of the invention to modify the catalyst of Bjerrum et al. with a Pt/Au/Ni catalyst, because Buchanan et al. teaches that the power density of the fuel cell stack can be increased while reducing the capital cost per unit of power, thereby providing a fuel cell with improved performance (col. 1, lines 10-37).

As to Claims 3-5, Bjerrum et al. discloses wherein the membrane comprises an alkaline polymer containing at least one aromatic ring with at least one nitrogen atom, such as polybenzimidazole (pg. 9, line 15 to pg. 10, line 5).

As to Claim 6, Bjerrum et al. discloses wherein the membrane comprises a polymer blend of more than one polymer (pg. 9, line 15 to pg. 10, line 13).

As to Claims 7 and 34, Bjerrum et al. discloses wherein the at least one mineral acid is phosphoric acid (pg. 13, lines 19-30).

As to Claim 8, Bjerrum et al. discloses wherein said membrane comprises para-polybenzimidazoles (pg. 9, lines 29-35).

As to Claims 9-22 and 32, it is noted that claims 9-22 and 32 are product-by-process claims. “Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” *In re Thorpe*, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). Since Bjerrum et al.’s membrane is the same to that of the Applicant’s, Applicant’s process is not given patentable weight in this claim.

As to Claim 23, Bjerrum et al. discloses wherein at least one electrode comprises a catalyst comprising a composite of platinum with chromium, titanium or tungsten (pg. 16, lines 20-26). Bjerrum et al. does not specifically disclose wherein the catalyst comprises at least one precious metal of the platinum group, and/or at least one precious metal Au and/or Ag, as well as Ni.

As to Claim 24, Bjerrum et al. discloses wherein the catalyst is applied to the membrane (pg. 16, lines 20-22).

As to Claims 28 and 33, Bjerrum et al. discloses wherein the catalyst loading of the membrane electrode unit is  $0.1 \text{ mg/cm}^2$  to  $1.0 \text{ mg/cm}^2$  (pg. 17, lines 4-17).

As to Claim 29, Bjerrum et al. discloses wherein the catalyst particles include carbon as a support ((pg. 17, lines 4-17).

As to Claim 30, Bjerrum et al. discloses wherein the weight ratio of catalyst particles is in a range of 1:100 or 100:1 (pg. 16, lines 20-22).

6. Claims 2 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjerrum et al. (WO 01/18894 A2, found in IDS) in view of Buchanan et al. (US 5,759,944 A), as applied to claims 1 and 3-24 and 28-34 above, and in further view of Kiefer et al. (US 2005/0084727 A1).

As to Claim 2, Bjerrum et al. and Buchanan et al. do not specifically disclose wherein a polyphosphazene is employed as the polymer with at least one nitrogen atom.

However, Kiefer et al. teaches of a PEM comprising a polymer with a nitrogen atom such as a polyphosphazene polymer or a polyazole (polybenzimidazole) (paragraph [0041]). Kiefer is identifying the two polymers as functional equivalents for use in membranes of fuel cells. The courts have found that since both Bjerrum et al. and Kiefer et al. both teach a suitable polymer for a membrane in a fuel cell, it would have been *prima facie* obvious to substitute one material for the other. Express suggestion to substitute one equivalent for another need not be present to render such substitution obvious. See MPEP 2144, KSR.

As to Claim 25, Bjerrum et al. and Buchanan et al. do not specifically disclose wherein the catalyst layer has a thickness of 0.1 to 50 microns.

However, Kiefer et al. teaches of a catalyst layer with a preferable thickness in the range of 1 to 1,000 microns. This overlaps the claimed ranges. The courts have held that when “a prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness.” *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

As to Claims 26-27, Bjerrum et al. and Buchanan et al. do not specifically disclose the particle sizes of the catalyst.

However, Kiefer et al. teaches of catalyst particles with a preferable size of 1 to 1,000 nm (paragraph [0166]). This overlaps the claimed ranges. The courts have held that when “a prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a *prima facie* case of obviousness.” *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003).

### ***Response to Arguments***

7. Applicant's arguments with respect to claims 1-34 have been considered but are moot in view of the new ground(s) of rejection.

8. Applicant's arguments filed February 25, 2011 have been fully considered but they are not persuasive.

*Applicant's principal arguments are:*

- a) *Kiefer teaches a proton conductive membrane which is doped with vinyl-phosphonic acid monomers, and therefore does not contain a mineral acid such as phosphoric acid (claims 1-34).*

In response to Applicant's arguments, please consider the following comments.

- a) Kiefer et al. does teach wherein the polymer membrane can be expanded with organic solvents such as phosphoric acid (paragraph [0126]).

### ***Conclusion***

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.



Art Unit: 1727

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ADAM A. ARCIERO whose telephone number is (571)270-5116. The examiner can normally be reached on Monday to Friday 7am to 4pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Barbara Gilliam can be reached on 571-272-1330. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Adam A Arciero/  
Examiner, Art Unit 1727

/Barbara L. Gilliam/  
Supervisory Patent Examiner, Art Unit 1727